UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P O Box 1450
Alexandria, Virginia 22313-1450
www uspto gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/698,111	10/31/2003	Michael Harville	200310949-1	8918

22879 7590 11/28/2008
HEWLETT PACKARD COMPANY
P O BOX 272400, 3404 E. HARMONY ROAD
INTELLECTUAL PROPERTY ADMINISTRATION
FORT COLLINS, CO 80527-2400

EXAMINER	
KRASNIC, BERNARD	
ART UNIT	**PAPER NUMBER**
2624	
NOTIFICATION DATE	**DELIVERY MODE**
11/28/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

JERRY.SHORMA@HP.COM
mkraft@hp.com
ipa.mail@hp.com

Office Action Summary	Application No.	Applicant(s)	
	10/698,111	HARVILLE, MICHAEL	
	Examiner	Art Unit	
	BERNARD KRASNIC	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _25 August 2008_.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-40_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-40_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 8/21/2008 has been entered.

2. The application has pending claim(s) 1-40.

3. Applicant's arguments with respect to claim(s) 1-40 have been considered but are moot in view of the new ground(s) of rejection because of the Request for Continued Examination (RCE).

4. Applicant's arguments filed 8/21/2008 have been fully considered but they are not persuasive.

The Applicant alleges, "Independent Claims 1, 23 and 32 have been amended ..." in page 10, and states respectively that the support for the amendments can be found among other places in pages 11, 13, and 14 and Figures 4-5. However the Examiner disagrees because the Examiner has searched the specification and has not found any evidence that the application has support for claiming the specific steps of not requiring the generation of other plan-view images based on other orientations of said

object; for example in amended independent claims 1 and 23 respectively the claim limitation language “wherein other plan-view images based on other orientations of said object are not required”; for example in amended independent claim 32 the claim limitation language “said classifier does not require other plan-view images based on other orientations of said object”. The Applicant is advised to either amend the claims further or show the Examiner clear support of possession in the specification for all the amended claim limitations with respective arguments showing and indicating that possession of such claim language is actually appropriate in terms of Written Description criteria [35 U.S.C. 112, 1st paragraph].

The Applicant alleges, “MISCHARACTERIZATIONS OF APPLICANTS’ STATEMENTS …” in pages 10-11, and states respectively that the Examiner has mischaracterized Applicants' statements [for Example on the Office Action dated November 11, 2008 and the Office Action dated November 5 2007] and that the Applicants respectively request that future Office Actions not do so. The Examiner would like to point out that there were no Office Actions dated November 11, 2008 or November 5, 2007. Further clarification of appropriate Office Action dates would be requested for such an argument to be considered.

The Applicant alleges, “MAHBUB …” in pages 11-12, and states respectively that Mahbub teaches [as part of determining the presence of the occupant] classifying and locating items in y, z and z, x planes such as a seat back which is different from the amended limitation of “generating said plan-view image as if said object were viewed from above and wherein other plan-view images based on other orientations of said

object are not required". The Examiner disagrees because Mahbub discloses a plan-view image generator / segmentation of a scene for generating of said plan-view image / segmented 3D image based on said depth data / 3D image components relating to distance (see [0051] at lines 1-3, [0059], [0061] at lines 3-6, [0088], the 3D image is segmented to remove background clutter using thresholding means with the 3D X Y and Z components which relate to the distance of the object to the imaging camera system), wherein said generating of said plan-view image / segmented 3D image includes generating said plan-view image as if said object / seating area of a vehicle with possible occupant were viewed from above / headliner above the rearview mirror (see Fig. 1b) and wherein other plan-view images based on other orientations of said object are not required / fixed orientation (see Mahbub, Figs. 1b and 2, [0041] at lines 1-5, [0045] at lines 2-4, [0056] at lines 6-8, a 3-D imaging system is located at the headliner above the rear view mirror which is above the seating area to provide the maximum field of view with minimal obstruction and this imaging system is installed in the vehicle with a fixed orientation and position to provide the appropriate corresponding 3D coordinate system). Also Mahbub discloses said classifier / robust classifier does not require additional information about said object / seating area that was obtained at a different time than said image was obtained in order to classify said plan-view template / 2D XY, YZ or ZX plane images (see [0088] at lines 9-11, [0112] at lines 3-4, individual features may individually distinguish between certain properties of the specific scenarios [e.g. occupant present, occupant not present, etc.] and the 2D features are made for each plane individually as is illustrated for the projection on the XY plane for example in

paragraphs [0112]-[0117], [0045] at lines 1-4, [0051] at lines 1-3, the 3D imaging system using a stereo vision system takes a respective image of the same scene with each camera and produces a 3D coordinate using depth data relating to distance and therefore is not variant on time). Therefore, the claims rejected under Mahbub are still not in condition for allowance because they are still not patentably distinguishable over the prior art references.

The Applicant alleges, “In paragraph 10 and 11 ...” in page 13 through “More specifically, Applicants respectfully submit ...” in page 14, and states respectively that there is no motivation to combine the teachings of Carrot and Zhang because these references teach away from the suggested modification. The Examiner disagrees and points to Carrot at col. 3 in lines 33-43. Carrot is describing different alternatives of defining and classifying pathological or lesion or abnormal regions and in one alternative to the classification, Carrot points to the Zhang reference. Therefore for the reference to point to the secondary reference Zhang, motivation for the suggested modification of the alternative Zhang classifier is definitely present. Further in response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, as discussed above, Carrot

is disclosing different alternatives to the classification of these pathological or lesion or abnormal regions and points to the Zhang reference as an example for a possible alternative. Therefore, the claims are still not in condition for allowance because they are still not patentably distinguishable over the prior art references.

The Applicant alleges, “CARROT ...” in page 14 through “DIFFERENCE BETWEEN CARROT ...” in pages 14-15, and states respectively that Carrot teaches displaying changes between historical and later mammorgraphic images to detect temporal differences between the historical and later mammographic images which is different from the amended claim limitation of said classifier does not require additional information about said object that was obtained at a different time than said image was obtained because Carrot is teaching temporal difference detection. Firstly, as discussed above, Carrot discloses several alternatives for the classification of the pathological or lesion or abnormal regions in the currently registered breast image information. One alternative for processing the classification is using historical images of the breast image data which is being analyzed [the current registered breast image data is for the current patient and the historical breast image data for that specific patient is used to find a temporal difference detection] (see Carrot, col. 3 at lines 28-31). The second alternative for processing the classification is using certain image shapes or characteristics which identify pathological regions through a pathological image library [the current registered breast image data is for the current patient and the pathological image library is a general image library of certain image shapes or characteristics which identify pathological regions, this library is not historical image data of the current

patients breast as in the first alternative] (see Carrot, col. 3 at lines 33-36). The third alternative for processing the classification is using Zhang et al's automated method which uses a trained neural network to decide and output either a positive detection of a micro-calcification on the mammogram image data or a negative detection [this is not historical image data of the current patients breasts as in the first alternative] (see Carrot, col. 3 at lines 37-40, see Zhang, col. 1 at lines 52-58). Therefore, the Examiner disagrees with the Applicant's argument because the Examiner used Carrot's second alternative and the [Zhang's] third alternative in the Final Office Action Rejection dated 6/05/2008 and still believes that the references teach and disclose the amended limitations. Specifically, Carrot discloses generating a plan-view image / slice (167) (see Fig. 7, col. 9 at lines 22-23, each slice is one or more layers of the three dimensional ultrasonorgraphic image data, one layer of a three dimensional image is a slice or a two dimensional image plan view) based in part on said depth data / depth or z', wherein said generating includes generating said plan-view image as if said object were viewed from above and wherein other plan-view images based on other orientations of said object are not required (see Figs. 3-4 and 7, the ultrasonographic imager is above the breast and fixed at a specific orientation). Also, Carrot discloses said classifier / correlator is trained / automated method to make a decision / suspect or not suspect lesion according to pre-configured parameters / library with defined pathological region data determined at least in part based on said class / abnormalities such as suspect lesions of said plan-view template (see Carrot, col. 3 at lines 33-43, the second and third alternatives, the plan-view template or slice is classified as having a

suspect lesion or not having a suspect lesion by a correlator which does a correlation with a library which has defined pathological region data signifying abnormalities such as lesions), said classifier does not require additional information about said object that was obtained at a different time than said image was obtained in order to classify said plan-view template (see Carrot, col. 3 at lines 33-36, the current registered breast image data is for the current patient and the pathological image library is a general image library of certain image shapes or characteristics which identify pathological regions [these certain image shapes or characteristics are not historical temporal images {at different times} of the current patients breast as is described in Carrot in col. 3 at lines 28-31 but rather general image shapes or characteristics which identify pathological regions]). Therefore, the claims are still not in condition for allowance because they are still not patentably distinguishable over the prior art references.

The Applicant alleges, “DIFFERENCE BETWEEN CARROT AND ZHANG ...” in page 15 through “SUMMARY ...” in pages 15-16, and respectively states that modifying Carrot to use Zhang’s neural network would change Carrot’s principle of operation and that Carrot and Zhang does not teach or suggest alone or in combination the amended claim limitations. However the Examiner disagrees as these issues have already been raised and addressed above.

Therefore, claims 1-40 are still not in condition for allowance because they are still not patentably distinguishable over the prior art references.

Claim Rejections - 35 USC § 101

5. Claim(s) 1-22 and 32-40 is/are rejected under 35 U.S.C. 101 as not falling within one of the four statutory categories of invention. Supreme Court precedent[1] and recent Federal Circuit decisions[2] indicate that a statutory "process" under 35 U.S.C. 101 must (1) be tied to another statutory category (such as a particular apparatus), or (2) transform underlying subject matter (such as an article or material) to a different state or thing. While the instant claim(s) recite a series of steps or acts to be performed, the claim(s) neither transform underlying subject matter nor positively tie to another statutory category that accomplishes the claimed method steps, and therefore do not qualify as a statutory process. For example the method steps for visual based recognition of an object do disclose a visual sensor, however a step significant to the basic inventive concept of the visual based recognition of an object is not tied to another statutory category such as a particular apparatus (i.e. a computer processor for processing the specific method steps).

Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the

---

[1] *Diamond v. Diehr*, 450 U.S. 175, 184 (1981); *Parker v. Flook*, 437 U.S. 584, 588 n.9 (1978); *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972); *Cochrane v. Deener*, 94 U.S. 780, 787-88 (1876).

[2] *In re Bilski*, 88 USPQ2d 1385 (Fed. Cir. 2008).

> art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 1-40 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The Examiner has searched the specification and has not found any evidence that the application has support for claiming the specific steps of not requiring the generation of other plan-view images based on other orientations of said object; for example in amended independent claims 1 and 23 respectively the claim limitation language "wherein other plan-view images based on other orientations of said object are not required"; for example in amended independent claim 32 the claim limitation language "said classifier does not require other plan-view images based on other orientations of said object".

The Applicant is advised to either amend the claims further or show the Examiner clear support of possession in the specification for all the amended claim limitations with respective arguments showing and indicating that possession of such claim language is actually appropriate in terms of Written Description criteria [35 U.S.C. 112, 1st paragraph].

Claims 2-22 are dependent upon claim 1.

Claims 24-31 are dependent upon claim 23.

Claims 33-40 are dependent upon claim 32.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1, 3, 4, 9, 12, 19-22, 23, and 25-26 rejected under 35 U.S.C. 102(b) as being anticipated by Mahbub (US 2002/0050924 A1).

Re Claim 23: Mahbub discloses a visual-based recognition system / occupant sensing system comprising a visual sensor / CCD stereo vision system for capturing depth data / 3D image relating to distance for at least a pixel of an image of an object / seating area of a vehicle with possible occupant (see [0045], lines 2-4, [0051], lines 1-3, [0081], lines 1-4, [0088]), said depth data / 3D image comprising information relating to a distance / distance from said visual sensor / CCD stereo vision system to a portion of said object / seating area of vehicle with possible occupant visible at said pixel (see [0045], lines 2-4, [0051], lines 1-3, [0081], lines 1-4, [0088]), said visual sensor / CCD stereo vision system comprising an emitter and sensor of light (a CCD camera system inherently has an emitter and sensor of light), wherein said light is selected from the group of electromagnetic radiation consisting of visible light, infrared light, and ultraviolet light (a

CCD camera system inherently operates under visible light); a plan-view image generator / segmentation of a scene for generating a plan-view image / segmented 3D image based on said depth data / 3D image components relating to distance (see [0051], lines 1-3, [0059], [0061], lines 3-6, [0088], the 3D image is segmented to remove background clutter using thresholding means with the 3D X Y and Z components which relate to the distance of the object to the imaging camera system), wherein said generating of said plan-view image / segmented 3D image includes generating said plan-view image as if said object / seating area of a vehicle with possible occupant were viewed from above / headliner above the rearview mirror (see Fig. 1b) and wherein other plan-view images based on other orientations of said object are not required / fixed orientation (see Mahbub, Figs. 1b and 2, [0041] at lines 1-5, [0045] at lines 2-4, [0056] at lines 6-8, a 3-D imaging system is located at the headliner above the rear view mirror which is above the seating area to provide the maximum field of view with minimal obstruction and this imaging system is installed in the vehicle with a fixed orientation and position to provide the appropriate corresponding 3D coordinate system); a plan-view template generator / 2D image generator for generating a plan-view template / 2D XY, YZ, or ZX plane images based on said plan-view image / segmented 3D image (see [0088], the segmented 3D image is projected to a 2D data set which will be used to classify for specific scenarios [e.g. occupant present, occupant not present, etc.]); and a classifier / robust classifier for making a decision concerning recognition of said object / distinguish between scenarios, wherein said classifier is trained to make said decision according to pre-configured parameters / 2D features that

were determined at least in part based on a class assigned to said plan-view template / 2D XY, YZ or ZX plane images (see [0081], lines 1-4, [0088], [0111], the robust classifier trained with the 2D features [the different 2D features are represented by Central Moments, Normalized moments, invariant moments, perimeter, area, eccentricity, etc.] with respect to the 2D plane images classifies if there is an occupant in the seating area, occupant forward facing, occupant reverse facing, etc.), said classifier / robust classifier does not require additional information about said object / seating area that was obtained at a different time than said image was obtained in order to classify said plan-view template / 2D XY, YZ or ZX plane images (see [0088] at lines 9-11, [0112] at lines 3-4, individual features may individually distinguish between certain properties of the specific scenarios [e.g. occupant present, occupant not present, etc.] and the 2D features are made for each plane individually as is illustrated for the projection on the XY plane for example in paragraphs [0112]-[0117], [0045] at lines 1-4, [0051] at lines 1-3, the 3D imaging system using a stereo vision system takes a respective image of the same scene with each camera and produces a 3D coordinate using depth data relating to distance and therefore is not variant on time).

As to claim 1, the claim is the corresponding method claim to claim 23 respectively. The discussions are addressed with regard to claim 23.

Re Claim 25: Mahbub further discloses wherein said visual sensor / CCD stereo vision system determines said depth data / 3D image relating to distance using stereopsis /

stereo vision based on image correspondences (see [0045], lines 2-4, [0051], lines 1-3, [0081], lines 1-4, [0088]).

Re Claim 26: Mahbub further discloses said plan-view image generator comprises a pixel subset selector / ROI for selecting a subset of pixels of said image, wherein said pixel subset selector / ROI is operable to select said subset of pixels based on foreground segmentation / segmentation of scene (see [0059], the segmentation of a scene determines the region of interest ROI by removing and eliminating background clutter).

As to claims 3-4, the claims are the corresponding method claims to claims 25-26 respectively. The discussions are addressed with regard to claims 25-26.

Re Claim 9: Mahbub further discloses wherein said extracting said plan-view template from said plan-view image is based at least in part on object tracking (see [0059], the respective seating area is tracked and that respective area is extracted as a XY, YZ, or ZX plane image).

Re Claim 12: Mahbub further discloses said object is a person / occupant (see [0081], lines 1-4).

Re Claim 19: Mahbub further discloses wherein said decision is to distinguish between a human / occupant and a non-human / no occupant (see [0081], lines 1-4).

Re Claim 20: Mahbub further discloses wherein said decision is to distinguish between a plurality of different human body orientations / orientations (see [0126]-[0127]).

Re Claim 21: Mahbub further discloses wherein said decision is to distinguish between a plurality of different human body poses / orientations or actual occupancy (see [0081], lines 1-4, [0126]-[0127], the different body poses may be the different body orientations or just the presence or no presence of the human occupant).

Re Claim 22: Mahbub further discloses wherein said decision is to distinguish between a plurality of different classes of people / infant, occupant, child (see [0081], lines 1-4, the different classes of people may be the different type of humans such as an infant, child or adult occupant).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 16, 17, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mahbub in view of Li et al (US 2003/0108244 A1, as applied in previous Office Action). The teachings of Mahbub have been discussed above.

However, Mahbub fails to teach of fairly suggest that the classifier is a support vector machine and that the plan-view template is a vector basis obtained by principal component analysis (PCA).

Li, as recited in claim 16, discloses said plan-view template / frontal face view is represented in terms of a vector basis / SVM's (see page 1, paragraph [0008], lines 18-24, [0011], lines 4-7).

Li, as recited in claim 17, discloses said vector basis is obtained through principal component analysis (PCA) (see page 1, paragraph [0008], lines 18-24, "PCA as they rotate and use the SVM's").

Li, as recited in claim 27, discloses said classifier is a support vector machine / SVM's (see page 1, paragraph [0008], lines 18-24, "PCA as they rotate and use the SVM's for multi-pose face detection").

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Mahbub's occupancy sensing system and method using Li's teachings by including the capabilities of having the classifier be a support vector machine and the plan-view template being a vector basis obtained by principal component analysis (PCA) in order to detect a person's face in input images

containing either frontal or non-frontal views regardless of the scale or illumination conditions associated with the face (see [0011], lines 4-7).

12. Claims 1, 2, 4, 6, 9, 11, 13-15, 18, 23, 24, 26, and 28-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carrot et al (US 6909792 B1, as applied in previous Office Action), in view of Zhang et al (US 5,491,627, as applied in previous Office Action) and Hoogenraad ("First results from the Philips Optical Mammoscope", SPIE, vol. 3194, pgs. 184-190, 1998).

Re Claim 1: Carrot discloses a method for visual-based recognition (see Abstract, lines 1, and 11-15) of an object / breast, said method comprising receiving depth data (see Fig. 7, col. 6, line 21, depth or z') for at least a pixel of an image of an object, said depth data comprising information relating to a distance from a visual sensor (see col. 6, lines 5-26, distance from the ultrasonic scanner [an ultrasonographic imaging system or its equivalent may be used to produce this visual depth data, its most common equivalent being the X-ray system] to the different parts of the breast tissue, col. 2, lines 41-44, col. 1, lines 25-28) to a portion of said object / breast shown at said pixel, said visual sensor / X-ray system comprising an emitter and sensor of light (see col. 2, lines 41-44, col. 1, lines 25-28, an ultrasonographic imaging system or its equivalent may be used to produce this visual depth data, its most common equivalent being the X-ray system, an X-ray system operates using emitters to emit x-ray light and light sensors to detect the light on the opposite end); generating a plan-view image / slice (167) (see Fig. 7, col. 9,

lines 22-23, _each slice is one_ or more _layers of the three dimensional_ ultrasonorgraphic _image data, one layer of a three dimensional image is a slice or a two dimensional image plan view_) based in part on said depth data, wherein said generating includes generating said plan-view image as if said object were viewed from above and wherein other plan-view images based on other orientations of said object are not required (see Figs. 3-4 and 7, the ultrasonographic imager is above the breast and fixed at a specific orientation); extracting a plan-view template / entire slice (167) (see Fig. 7, the template may be the entire slice / plan-view image itself) from said plan-view image; and processing said plan-view template / entire slice (167, see Fig. 7) at a classifier / correlator (30) (see Fig. 1, col. 2 line 45-47) to assign a class / abnormalities such as suspect lesions to said plan-view template, wherein said classifier / correlator is trained / automated method to make a decision / suspect or not suspect lesion according to pre-configured parameters / library with defined pathological region data determined at least in part based on said class / abnormalities such as suspect lesions of said plan-view template (see Carrot, col. 3, lines 33-43, the second and third alternatives, the plan-view template or slice is classified as having a suspect lesion or not having a suspect lesion by a correlator which does a correlation with a library which has a defined pathological region data signifying abnormalities such as lesions), said classifier does not require additional information about said object that was obtained at a different time than said image was obtained in order to classify said plan-view template (see Carrot, col. 3 at lines 33-36, the current registered breast image data is for the current patient and the pathological image library is a general image library of certain image shapes or

characteristics which identify pathological regions [these certain image shapes or characteristics *are not historical temporal images {at different times}* of the current patients breast as is described in Carrot in col. 3 at lines 28-31 but rather general image shapes or characteristics which identify pathological regions]).

However, Carrot fails to specifically suggest how the classifier is actually trained to make a decision. Carrot also fails to specifically suggest that emitted and sensed light is selected from the group of electromagnetic radiation consisting of visible light, infrared light, and ultraviolet light [Carrot's X-ray system emits and senses x-ray light].

Zhang discloses that the classifier / neural network is trained to make a decision / positive or negative detections (see Zhang, col. 1, lines 52-58, the neural network is trained to output either a positive detection of a micro-calcification on the mammogram or a negative detection).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Carrot's method using Zhang's teachings by including a neural network type system to Carrot's abnormality classifier in order to improve the classification by reducing the false-positive detections by limiting the detection to either a positive detection of an abnormality within the mammogram image or a negative detection (see Zhang, col. 1, lines 52-58).

However, Carrot as modified by Zhang still fails to specifically suggest that emitted and sensed light is selected from the group of electromagnetic radiation consisting of visible light, infrared light, and ultraviolet light [Carrot's X-ray system emits and senses x-ray light].

Hoogenraad discloses depth data / depth or z of the 3D breast images comprising information relating to a distance / depth or z of the 3D breast images from a visual sensor / optical mammoscope to a portion of said object / breast, said visual sensor comprising an emitter and sensor of light (see Figure 1, the optical mammascope operates using emitters to emit visible or infrared light and light sensors to detect the visible or infrared light on the opposite end), wherein said light is selected from the group of electromagnetic radiation consisting of visible light, infrared light, and ultraviolet light (see abstract, page 184, paragraph "The use of light to image ...", Figure 2 as an example of 780nm wavelength light which corresponds to visible or near infrared light but in general this optical tomography system operates with visible or infrared light).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify Carrot's method, as modified by Zhang, using Hoogenraad's teachings by replacing Carrot's X-ray system with the Optical Tomography Mammoscope in order to provide a non-invasive non-ionizing breast diagnostic test (see Hoogenraad, page 184, "the use of X-rays for diagnostic purposes might cause side effects" if used frequently due to the excessive exposure to the x-ray light).

Re Claim 2: Carrot further discloses receiving non-depth data / color (see col. 2, line 57, multicolor imagery) for said pixel.

Re Claim 4: Carrot further discloses selecting a subset / ROI of said depth data / multicolored data based on foreground segmentation / thresholding multicolored data (see col. 3, lines 58-60, getting ROI with thresholding gives features of breast, col. 3, lines 40-43).

Re Claim 6: Carrot further discloses receiving non-depth data / multicolored data for said pixel, and wherein said foreground segmentation / thresholding multicolored data is based at least in part on said non-depth data (see col. 1, lines 64-66, Abstract, lines 13-15, thresholding on ROI colored image, col. 3, lines 58-60).

Re Claim 9: Carrot further discloses extracting said plan-view template from said plan-view image is based at least in part on object tracking / ROI (see col. 3, 40-43, tracking ROI).

Re Claims 11: Carrot further discloses said plan-view image is based in part on said non-depth data (see col. 2, line 57, multicolor imagery, each slice or plan-view will also have multicolor imagery).

Re Claim 13: Carrot further discloses said plan-view image comprises a value based at least in part on an estimate of height / depth z' of a portion of said object / breast above a surface / pressure plate (83, 84) (see Fig. 3, col. 5, lines 59-61, the depth is considered as an estimate of height a result of the breast being on a pressure plate).

Re Claim 14: Carrot further discloses said plan-view image comprises a value based at least in part on color data for a portion of said object (see Abstract, lines 13-15, col. 1, lines 64-65, col. 3, lines 4-8, col. 2, line 57, multicolor imagery, each slice or plan-view will also have multicolor imagery).

Re Claim 15: Carrot further discloses said plan-view image comprises a value based at least in part on a count of pixels / ROI obtained by said visual sensor and associated with said object (see col. 3, lines 27-44, col. 4, lines 26-28, ROI has a certain amount or count of pixels).

Re Claim 18: Carrot further discloses performing height normalization / depth z' based on pressure plate (83, 84) on said plan-view template / slice (167) (see Figs. 3 and 7, col. 5, lines 59-61, the depth is considered as a height normalization as a result of the breast being on a pressure plate, the three dimensional image is therefore dependent upon the height normalization and therefore each template or slice is dependent upon the height normalization).

Re Claim 23: Carrot discloses a visual-based recognition system comprising a visual sensor (20) (see Fig. 1, col. 2, lines 41-45, Abstract, lines 1, and 11-15) for capturing depth data (see Fig. 7, col. 6, line 21, depth or z') for at least a pixel of an image of an object / breast, said depth data comprising information relating to a distance from said

visual sensor (see col. 6, lines 5-26, distance from the ultrasonic scanner [an ultrasonographic imaging system or its equivalent may be used to produce this visual depth data, its most common equivalent being the X-ray system] to the different parts of the breast tissue, col. 2, lines 41-44, col. 1, lines 25-28) to a portion of said object visible at said pixel, said visual sensor / X-ray system comprising an emitter and sensor of light (see col. 2, lines 41-44, col. 1, lines 25-28, an ultrasonographic imaging system or its equivalent may be used to produce this visual depth data, its most common equivalent being the X-ray system, an X-ray system operates using emitters to emit x-ray light and light sensors to detect the light on the opposite end); a plan-view image generator (20,24) for generating a plan-view image / slice (167) (see Fig. 7, col. 9, lines 22-23, _each slice is one_ or more _layers of the three dimensional_ ultrasonorgraphic _image data, one layer of a three dimensional image is a slice or a two dimensional image plan view_) based on said depth data, wherein said generating includes generating said plan-view image as if said object were viewed from above and wherein other plan-view images based on other orientations of said object are not required (see Figs. 3-4 and 7, the ultrasonographic imager is above the breast and fixed at a specific orientation); a plan-view template generator (20,24) for generating a plan-view template / slice (167) (see Fig. 7, the template may be the entire slice / plan-view image itself) based on said plan-view image; and a classifier / correlator (30) (see Fig. 1, col. 2 line 45-47) for making a decision concerning recognition / suspect or not suspect lesion of said object, wherein said classifier / correlator is trained / automated method to make said decision according to pre-configured parameters / library with defined pathological region data

that were determined at least in part based on a class / abnormalities such as suspect lesions assigned to said plan-view template (see Carrot, col. 3, lines 33-43, the second and third alternatives, the plan-view template or slice is classified as having a suspect lesion or not having a suspect lesion by a correlator which does a correlation with a library which has a defined pathological region data signifying abnormalities such as lesions), said classifier does not require additional information about said object that was obtained at a different time than said image was obtained in order to classify said plan-view template (see Carrot, col. 3 at lines 33-36, the current registered breast image data is for the current patient and the pathological image library is a general image library of certain image shapes or characteristics which identify pathological regions [these certain image shapes or characteristics are not historical temporal images {at different times} of the current patients breast as is described in Carrot in col. 3 at lines 28-31 but rather general image shapes or characteristics which identify pathological regions]).

However, Carrot fails to specifically suggest how the classifier is actually trained to make a decision. Carrot also fails to specifically suggest that emitted and sensed light is selected from the group of electromagnetic radiation consisting of visible light, infrared light, and ultraviolet light [Carrot's X-ray system emits and senses x-ray light].

Zhang discloses that the classifier / neural network is trained to make a decision / positive or negative detections (see Zhang, col. 1, lines 52-58, the neural network is trained to output either a positive detection of a micro-calcification on the mammogram or a negative detection).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Carrot's system using Zhang's teachings by including a neural network type system to Carrot's abnormality classifier in order to improve the classification by reducing the false-positive detections by limiting the detection to either a positive detection of an abnormality within the mammogram image or a negative detection (see Zhang, col. 1, lines 52-58).

However, Carrot as modified by Zhang still fails to specifically suggest that emitted and sensed light is selected from the group of electromagnetic radiation consisting of visible light, infrared light, and ultraviolet light [Carrot's X-ray system emits and senses x-ray light].

Hoogenraad discloses depth data / depth or z of the 3D breast images comprising information relating to a distance / depth or z of the 3D breast images from a visual sensor / optical mammoscope to a portion of said object / breast, said visual sensor comprising an emitter and sensor of light (see Figure 1, the optical mammascope operates using emitters to emit visible or infrared light and light sensors to detect the visible or infrared light on the opposite end), wherein said light is selected from the group of electromagnetic radiation consisting of visible light, infrared light, and ultraviolet light (see abstract, page 184, paragraph "The use of light to image ...", Figure 2 as an example of 780nm wavelength light which corresponds to visible or near infrared light but in general this optical tomography system operates with visible or infrared light).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify Carrot's method, as modified by Zhang, using Hoogenraad's teachings by replacing Carrot's X-ray system with the Optical Tomography Mammoscope in order to provide a non-invasive non-ionizing breast diagnostic test (see Hoogenraad, page 184, "the use of X-rays for diagnostic purposes might cause side effects" if used frequently due to the excessive exposure to the x-ray light).

Re Claim 24: Carrot further discloses said visual sensor is also for capturing non-depth data / color (see col. 2, line 57, multicolor imagery).

Re Claim 26: Carrot further discloses a pixel subset selector (52, 24) for selecting a subset / ROI of pixels of said image, wherein said pixel subset selector is operable to select said subset of pixels based on foreground segmentation / thresholding multicolored data (see Figs. 1 and 2a, see col. 3, lines 58-60, getting ROI with thresholding gives features of breast, col. 3, lines 40-43).

Re Claim 28: Carrot further discloses said plan-view image is based in part on said non-depth data (see col. 2, line 57, multicolor imagery, each slice or plan-view will also have multicolor imagery).

Re Claim 29: Carrot further discloses to generate a three-dimensional point cloud / three dimensional data set based on said depth data / direction z', wherein a point of said three-dimensional point cloud comprises a three-dimensional coordinate / x', y', z' (see Fig. 7, col. 3, lines 4-7, col. 6, lines 20-21).

Re Claim 30: Carrot further discloses to divide said three-dimensional point cloud / three dimensional data set into a plurality of slices such that a plan-view image (167) may be generated for at least one slice of said plurality of slices (see Fig. 7, col. 3, lines 4-7, col. 9, lines 16-27).

Re Claim 31: Carrot further discloses to extract a plan-view template / slice (167) from at least two plan-view images / plurality of slices corresponding to different slices of said plurality of slices, wherein said plan-view template comprises a transformation / summing data points of at least a portion of said plan-view images / entire slice, such that said plan-view template is processed at said classifier (see Fig. 7, col. 9, lines 22-27).

13. Claims 5, 7, 8, 32, 33, 35-37, 39 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carrot, as modified by Zhang and Hoogenraad, as applied to claims 1 and 23 above. The teachings of Carrot, as modified by Zhang and Hoogenraad have been discussed above.

Re Claim 5 and 32 respectively: Carrot, <u>as recited in claim 5</u>, further discloses generating a three-dimensional point cloud / three dimensional data set of said subset / ROI of pixels based on said depth data / direction z' (col. 3, lines 27-37 and 40-43, col. 6, lines 20-21), wherein a point of said three-dimensional point cloud comprises a three-dimensional coordinate / x', y', z' (see Fig. 7, col. 3, lines 4-7); partitioning said three-dimensional point cloud into a plurality of vertically oriented bins; and mapping at least a portion of points of said plurality of vertically oriented bins into at least one said plan-view image / ROI or slice addition based on said three- dimensional coordinates, wherein said plan-view image is a two-dimensional representation / slice of said three-dimensional point cloud comprising at least one pixel corresponding to at least one vertically oriented bin of said plurality of vertically oriented bins (see col. 3, lines 27-37 and 40-43, ROI may cover these vertical bins, col. 9, lines 22-26, addition of all the possible slices will then cover all the bins).

Although the partitioning step of Carrot's three dimensional cloud is not specifically disclosed, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have such a feature where the vertical bin is each depth or z' axis point, so for example, if the point [x',y'] is looked at, all the same points [x',y'] along the different z' values creates a vertical bin.

As to claim 32, all the limitations are taught by Carrot and Zhang and Hoogenraad in the same manner as Carrot and Zhang and Hoogenraad taught claims 1, 5, and 6 respectively above.

Re Claim 7: Carrot further discloses dividing said three-dimensional point cloud into a plurality of slices (164, 167), and wherein said generating said plan-view image / slice (167) is performed for at least one slice of said plurality of slices (see Fig. 7, col. 3, lines 4-7).

Re Claim 8: Carrot further discloses extracting a plan view template / slice (167) from at least two plan-view images / plurality of slices corresponding to different slices of said plurality of slices, wherein said plan-view template comprises a transformation / summing data points of at least a portion of said plan-view images / entire slice, such that said plan-view template is processed at said classifier (see Fig. 7, col. 9, lines 22-27).

Re Claim 33: Carrot further discloses said three-dimensional point cloud / three dimensional data set and said plan-view image / entire slice (167) are also based at least in part on non-depth data / multicolored data (see Fig. 7, col. 1, lines 64-65, col. 3, lines 4-7, Abstract, lines 11-15).

Re Claim 35: Carrot further discloses wherein said plan view template comprises a transformation / summing data points of at least a portion of said plan view image / entire slice (167), and such that said plan-view template is processed at said classifier (see Fig. 7, col. 9, lines 22-27).

Re Claim 36: Carrot further discloses dividing said three-dimensional point cloud / three dimensional data set of into a plurality of slices, and wherein said mapping / summing data points at least a portion of points comprises mapping points within a slice of said plurality of slices of said three-dimensional point cloud into said plan-view image / slice (see col. 3, lines 4-7, col. 9, lines 22-27).

Re Claim 37: Carrot further discloses wherein said plan view template comprises a transformation / summing data points of at least a portion of said plan view image / entire slice (167), such that said plan-view template is processed at said classifier (see Fig. 7, col. 9, lines 22-27).

Re Claim 39: Carrot further discloses said plan-view image / slice is generated from a subset / ROI of pixels of said image selected based on foreground segmentation / thresholding multicolored data (see col. 3, lines 58-60, getting ROI with thresholding gives features of breast, col. 3, lines 40-43).

Re Claim 40: Carrot further discloses extracting a plan view template / entire slice (167) from at least two plan view images corresponding to different slices of said plurality of slices, wherein said plan view template comprises a transformation / summing of data points of at least a portion of said plan view images / entire slice (167), such that said plan-view template is processed at said classifier (see Fig. 7, col. 9, lines 22-27).

14. Claims 3, 25, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carrot, as modified by Zhang and Hoogenraad, as applied to claims 1, 23 and 32 above, and further in view of Getty et al (US 6,031,565). The teachings of Carrot as modified by Zhang and Hoogenraad have been discussed above.

However, Carrot as modified by Zhang and Hoogenraad, fails to teach of fairly suggest depth data is determined by stereopsis.

Getty, as recited in claim 3 and claim 34 respectively, discloses said depth data using stereopsis / one or more x-ray's based on image correspondences (see Getty, col. 2, lines 4-7, Getty's stereopsis x-ray system improves Carrrot's x-ray system by fusing two images to provide highly accurate image registration).

Getty, as recited in claim 25, discloses said visual sensor determines said depth data using stereopsis / one or more x-ray's based on image correspondences (see Getty, col. 2, lines 4-7, Getty's stereopsis x-ray system improves Carrrot's x-ray system by fusing two images to provide highly accurate image registration).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify Carrot's method, as modified by Zhang and Hoogenraad, using Getty's teachings by including a stereopsis analysis to the Carrots imaging system in order to provide a highly accurate image registration (see Getty, col. 2, lines 6-7).

15. Claims 10, 16, 27, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carrot, as modified by Zhang and Hoogenraad, as applied to claims 1, 23 and 32 above, and further in view of Campanini et al (US 7,181,056 B2). The teachings of Carrot as modified by Zhang and Hoogenraad have been discussed above.

However, Carrot as modified by Zhang and Hoogenraad, fails to teach of fairly suggest that the classifier is a support vector machine.

Campanini, as recited in claim 10, discloses said classifier is a support vector machine / SVM's (see Campanini, col. 2, lines 40-47, slices or plan-view image will be affected by SVM's).

Campanini, as recited in claim 16, discloses said plan-view template is represented in terms of a vector basis / SVM's (see Campanini, col. 2, lines 40-47, since slices or plan-view image will be affected by SVM's, so will the templates since the template is the entire slice).

Campanini, as recited in claim 27 and claim 38 respectively, discloses said classifier is a support vector machine / SVM's (see Campanini, col. 2, lines 40-47, slices or plan-view image will be affected by SVM's).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify Carrot's method, as modified by Zhang and Hoogenraad, using Campanini's teachings by including a SVM analysis to the Carrots imaging system in order to achieve an improved classification (see Campanini, col. 2, lines 40-47).

Conclusion

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Nichani et al discloses a method and system for enhanced portal security through stereoscopy; Bramblet et al discloses tailgating and reverse entry detection; Geng discloses a face recognition system which develops 2D images based on a 3D model and processes the recognition on the 2D images.

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bernard Krasnic whose telephone number is (571) 270-1357. The examiner can normally be reached on Mon-Thur 8:00am-4:00pm and every other Friday 8:00am-3:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jingge Wu can be reached on (571) 272-7429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jingge Wu/
Supervisory Patent Examiner, Art Unit 2624
Bernard Krasnic
November 15, 2008